

JX15

PFAS

**An Overview of the Science and Guidance for Clinicians
on Per- and Polyfluoroalkyl Substances (PFAS)**

PFAS AND HUMAN HEALTH

Human Studies

Human studies have found associations between exposure to PFAS and adverse health effects in many organ systems. The C8 Health Study^{9,10} an early epidemiological study of 69,030 persons ≥ 18 years of age, found evidence suggestive of associations (though not statistically significant) between exposure to PFOA and six diseases:

- high cholesterol (hypercholesterolemia),
- ulcerative colitis,¹¹
- thyroid toxicity,¹²
- testicular cancer,¹³
- kidney cancer,¹⁴ and
- preeclampsia, and elevated blood pressure during pregnancy.¹⁵

At the time of the study, C8 Health Study participants had five-times higher PFOA concentrations in blood compared to a representative U.S. population (i.e., NHANES 1999-2000).¹⁶ Epidemiological studies performed since the C8 Health Study have continued to evaluate the health effects listed above, as well as others (e.g., liver, kidney, endocrine, immune, pulmonary, reproductive, and neurobehavioral). Although causal relationships have not been established, some studies find positive associations between PFAS exposure and adverse health effects (see Table 1). These studies are limited by the lack of exposure monitoring data associated with epidemiological studies and the limited analysis of other routes of exposure. Further, most studies have focused on the potential health effects related to PFOA and/or PFOS, while fewer studies have evaluated the potential health effects for other PFAS. The overall health effects are summarized in Table 1 on the following page.

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9. The C8 Health Study was a series of exposure and health studies in the Mid-Ohio Valley communities, which had been potentially affected by the releases of PFOA (or C8) emitted since the 1950s from the Washington Works plant in Parkersburg, West Virginia. C8 signifies that the study looked at selected long chain PFAS. <http://www.c8sciencepanel.org/index.html>.
 10. C8 Medical Panel Guidance. http://www.c-8medicalmonitoringprogram.com/docs/med_panel_education_doc.pdf
 11. <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1206449>.
 12. <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1104370>.
 13. <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1205829>.
 14. <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1205829>.
 15. <https://academic.oup.com/aje/article/170/7/837/92302/>; <https://insights.ovid.com/crossref?an=00001648-201205000-00007>.
 16. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2799461/>